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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR        | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|-----------------------------|---------------------|------------------|
| 10/526,258   | 09/12/2005  | Alastair Dent               | 53037-7007          | 7061             |
| 66228 7590 02/02/2011<br>UNGARETTI & HARRIS LLP<br>INTELLECTUAL PROPERTY GROUP - PATENTS<br>70 WEST MADISON STREET<br>SUITE 3500<br>CHICAGO, IL 60602-4224 |             |                             |                     |                  |
| EXAMINER<br>PILKINGTON, JAMES  |             |                             |                     |                  |
| ART UNIT<br>3656   |             | PAPER NUMBER                |                     |                  |
| NOTIFICATION DATE<br>02/02/2011  |             | DELIVERY MODE<br>ELECTRONIC |                     |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

IPDOCKET@UHLAW.COM

### Office Action Summary

**Application No.**

10/526,258

**Applicant(s)**

DENT, ALASTAIR

**Examiner**

JAMES PILKINGTON

**Art Unit**

3656

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 January 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3,5-10,15-18,24 and 25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,5-10,15-18,24 and 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No.(s)/Mail Date: \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 8, 9, 15-17, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, WO 02/060653, in view of Akin, USP 4,565,104.

Regarding claims 1, 8, 9, 15-17, 24 and 25, Harris discloses a back-drivable surgical robot head comprising:

- a frame (6)
- an arm (12) for carrying a tool (14) the position of which is to be controlled;
- a manually-graspable driving member (16) on said arm (12);
- a first rotation control mechanism (20) for rotating the arm about a first axis (A1) with respect to said frame (6)
- the first rotation control mechanism (28) comprising a first rotational motor (30)
- in which the first motor (30) is mounted for pivotal motion with respect to a frame of the head
- said head being back-drivable wherein manual forces applied to said driving member (16) by a user grasping said driving member (16) cause said arm (12) to rotate to a desired position, said motor (30) responding to

said manual forces to ensure that said arm moves smoothly to said position with constant low resistance in an unconstrained region (RI) and with increasing resistance towards a constraint boundary (increasing resistance in RII, see the graph in figure 3 and pages 9-11 which discusses the boundary control and increasing stiffness/resistance)

- a second rotation control mechanism (20) for rotating the arm about a second axis (A1), the said mechanism comprising a second rotational motor (2)
- the first axis (A2) is perpendicular to the second axis (A1)
- the arm (12) is extendible along a third axis (A3)
- in which the first (A2), second (A1) and third axes (A3) intersect at a point
- a force sensor (18) for sensing forces applied to the driving member (16) by a user;
- wherein the first rotational control mechanism (28) is arranged to rotate the arm about the first axis in response to the sensed forces.

Harris does not disclose that the rotation control mechanisms comprising a lead screw having a rotational motor at one end and said lead screw and motor being mounted at said one end to pivot with respect to a frame and a bearing which moves longitudinally of the lead screw as it rotates, the bearing being pivotally coupled to an offset crank of or secured to the arm.

Akin teaches rotation control mechanisms comprising a motor (29), a lead screw (24) wherein the motor (29) and the lead screw (24) are mounted at said one end to pivot

with respect to a frame (12 pivots about 15 which is secured to an exterior frame) and a bearing (37) which moves longitudinally of the lead screw (24) as it rotates, the bearing being pivotally coupled to an offset crank (32) of or secured to an arm (34/35) for the purpose of providing a linear actuator to rotate a load that minimizes loss of moment arm at the extremes of rotational travel of the load.

It would have been obvious to one having ordinary skill in the art to modify Harris and provide a first and second rotation control mechanism that comprises a lead screw and a bearing which moves longitudinally of the lead screw as it rotates, and motor being mounted at said one end to pivot with respect to a frame, the bearing being pivotally coupled to an offset crank of or secured to the arm, the lead screw has a high lead angle, resulting in the lead screw being mounted for pivotal motion with respect to a frame of the head, as taught by Akin, for the purpose of providing a linear actuator to rotate a load that minimizes loss of moment arm at the extremes of rotational travel of the load. In additional substituting one transmission mechanism for another would have been obvious to one having ordinary skill in the art. The combination would result in a device which would operate with a lead screw which would pivot between a zero position and a maximum pivot position relative to the frame when an applied force is sensed.

Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, WO 02/060653, in view of Akin, USP 4,565,104 and further in view of Yamanaka, USP 4,825,714.

Harris in view of Akin discloses all of the claimed subject matter discussed above.

Akin does not disclose that the motor is directly secured to the lead screw, without any intervening gears.

Yamanaka teaches a lead screw drive arrangement wherein the motor (11) is directly secured to the lead screw (15), without any intervening gears.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the motor spindle arrangement of Akin with the direct drive system of Yamanaka, for the predictable result of removing play/backlash that is found between intervening gears.

Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, WO 02/060653, in view of Akin, USP 4,565,104 and further in view of Zufle, US PGPub 2003/0109953.

Harris in view of Akin discloses all of the subject matter as discussed above.

Harris does not disclose a first sensor for measuring the position of the arm and a second sensor for measuring the rotation of the motor and sounding an alarm if there is an inconsistency.

Zufle teaches a detection system which uses a first sensor for measuring the position of an arm/movement member (detector 5) and a second sensor for measuring the rotation of the motor (paragraph 0025) and sounding an alarm if there is an inconsistency (sets down drive 3 or paragraph 0017) for the purpose of providing a

direct and indirect detection method to ensure movement of the arm is correct (paragraph 0015 and 0025).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Harris and provide a first sensor for measuring the position of the arm and a second sensor for measuring the rotation of the motor and sounding an alarm if there is an inconsistency, as taught by Zufle, for the purpose of providing a direct and indirect detection method to ensure movement of the arm is correct.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harris, WO 02/060653, in view of Akin, USP 4,565,104 and further in view of Zimmerman, USP 6,494,005.

Harris in view of Akin discloses all of the subject matter as discussed above.

Harris does not disclose that the arm is extendible on a third lead screw which is rotated by a third rotational motor.

Zimmerman teaches an arm (12) extendable on a lead screw (50) which is rotated by a motor (30) for the purpose of concealing the motor within an arm segment (C1/L45-52) which in turn reduces the size of the device.

It would have been obvious to one having ordinary skill in the art to replace the rack and pinion drive system of Harris with a third lead screw which is rotated by a third rotational motor, as taught by Zimmerman, for the purpose of concealing the motor within an arm segment which in turn reduces the size of the device.

### ***Response to Arguments***

In response to the prior office action Applicant has submitted two affidavits under 37 CFR 1.131 to swear behind the Harris document. However, the second affidavit submitted by Graeme Brookes includes three dates which have not been redacted. Exhibit C, which is an email, has a sent date of April 23, 2002 which is approximately three months prior to August 8, 2002, the date Applicant is attempting to swear behind. Exhibit D, which is a memo, and Exhibit E, another memo, are dated July 12, 2002 and July 26, 2002, respectively. Since there is a fifty day time period between April 23 and July 12 there is a question of diligence raised by the affidavits. What happened in this time window? Since the affidavits raise a question of diligence they do not proper swear behind the Harris document.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.



Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES PILKINGTON whose telephone number is (571)272-5052. The examiner can normally be reached on Monday - Friday 7-3.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on (571)272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAMES PILKINGTON/  
Examiner, Art Unit 3656  
1/28/11